

THE MARCONI TRANSOCEANIC EXPERIMENTS.

The SCIENTIFIC AMERICAN is enabled to present to its readers the first photographs that have been taken of Marconi's station at Signal Hill, Newfoundland—a station which will hereafter be memorable as the first place where a transoceanic wireless message was received.

That the signals were received can hardly be doubted. Marconi himself has publicly stated that the signals were heard with certainty and distinctness. At the Signal Hill station a receiving wire was employed about 400 feet high, which was supported by a kite. At Cornwall, the transmitting station was provided with an apparatus which was much more powerful than that previously used for communicating at distances of 200 miles. Even with a transmitter of increased power, the signals were heard only with the aid of a most sensitive telephone receiver. Before leaving England, Marconi had made elaborate arrangements to transmit the letter S of the Morse alphabet at a certain time. From English reports it would seem that the letter was telegraphed many times without appreciably affecting the Newfoundland receiver, until the memorable Wednesday of December 11, 1901. But upon this point nothing definite is yet known. We must await the paper which Marconi has promised to read as soon as possible before some scientific society. Marconi has had unusual technical difficulties to contend with. His poles have worked very unsatisfactorily; and the balloons and kites have not given the results that he expected. In Newfoundland a pole 130 feet high has been erected with all possible care, and yet it will not be able to withstand one of the violent gales so prevalent at this time of the year along the Canadian Atlantic coast. When it is considered that the poles cost \$1,200 each, how enormous is the expense of experimenting can easily be appreciated.

At present, Marconi is endeavoring to reduce the height of the masts. But until he has solved the problem of operating nearer to the surface, he will probably construct for the purpose of his work a tower of such size that it cannot be blown down. In the experiments of Thursday, December 12, the kite was lost within one minute after the receipt of the letter "S."

The announcement of his success has earned for Marconi a popularity which is not the fortune of all inventors. The Canadian government has determined to stand by him in his fight against the Anglo-American Cable Company. Officials have honored him everywhere. At a dinner given to Marconi, Governor Boyle spoke glowingly of Marconi's achievement. Marconi replied: "If my system of wireless telegraphy can be commercially established between dif-

ferent parts of the earth, the possibility of which I may state I have not the slightest doubt, it would bring about an enormous cheapening in the methods of communication at present existing. The system of submarine cables of to-day fulfills the demand of communication to a great extent. But the great cost of the cables themselves and their heavy working expenses place the existing method beyond the reach of a majority of the people inhabiting the various countries of the world. But could this new method be applied, I believe the cost of what we now call cabling to England might be reduced at least twenty-fold. I do not see why, eventually, with the wireless system, this cost should not be reduced to one cent a word or less. . . . This colony of Newfoundland



Photograph by James Vey.

MARCONI RAISING THE GREAT KITE AT SIGNAL HILL, NEWFOUNDLAND.

is the first in which a message was received by cable, across the ocean, and I am glad to say it has also been the first to receive a message across this same ocean without a cable."

Although they have unlimited confidence in Marconi's ability and rely implicitly upon his honesty, many scientists are by no means convinced that transoceanic wireless telegraphy is certain. Edison believes that success would not have been attained, perhaps, if Marconi had attempted to transmit an entire sentence. Moreover, the receiver was not the ordinary apparatus, but a telephone of the most delicate construction, and most sensitive in operation. Even with this fine instrument the signals are said to have been barely distinguishable. When these facts are kept in view, the necessity of further and more elaborate experiments and the transmission of entire messages is apparent.

The Newfoundland work is of interest technically, not only by reason of the enormous distance involved, but also by reason of the fact that the ratio of mast height to distance was not maintained. From the reports it would seem that poles were used in Cornwall no greater in height than those commonly employed for the transmission of messages for 50 or 60 miles. The curvature of the earth, formerly considered a formidable obstacle, seems to have but little effect

upon the transmitted waves. Between England and Canada there is a huge curve 100 miles high. The amount of electrical energy required varies as the square of the distance. Up to the time of these last experiments Marconi had succeeded in telegraphing some 400 miles. To telegraph 1,800 miles would necessitate the expenditure of energy twenty times as great. Whether this ratio held good in the case of the transatlantic signals remains to be seen.

Military Telephone System.

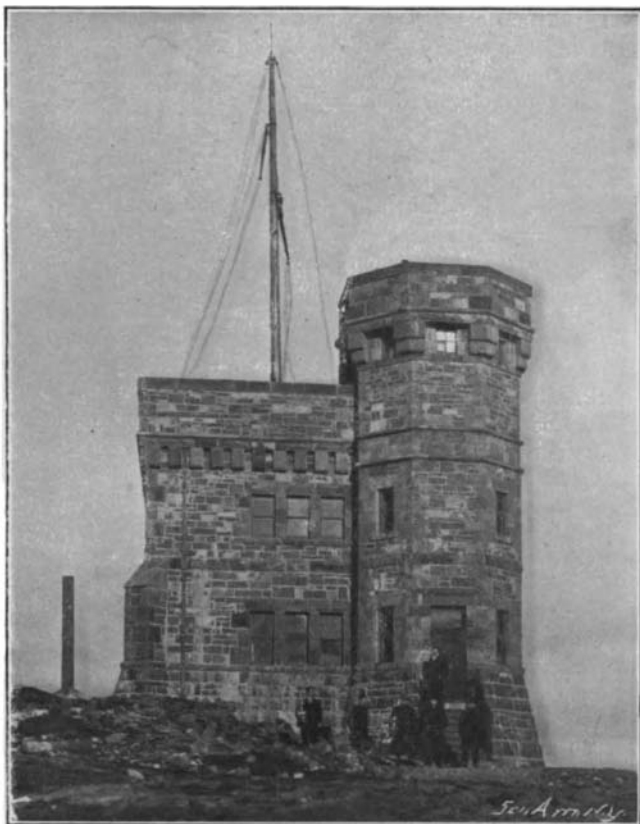
Captain Charolles has devised a system of military telephone lines which has proved quite successful, and is now used in the French and other armies. After making a number of experiments he found that a bare wire laid upon the ground, provided it was not too wet, could be used for telephone communication with earth-return over distances of several miles. The advantages of such a system in military work, where the line is to be rapidly and easily installed, are at once apparent. To diminish the weight of the line he uses a special alloy known as Martin bi-metal. The wire is 0.024 inch in diameter and weighs about 10 pounds per mile. It is rolled on flat spools of galvanized

iron 8 inches in diameter and 2 inches between faces. The spools are held in the hand and the wire rolled along the ground, and the material is so light that a man on foot can easily carry 3 or 4 miles of wire, and put down the line at the rate of 2½ miles an hour. An interesting experiment has been made lately at Paris. The station was established at the Reuilly Barracks, within the city limits, and the telephone corps set out with the regiment which was on march to the Fort of Vincennes, just outside the city. It was found that the regiment could remain in constant communication with the barracks by means of a 0.04-inch wire which was placed directly upon the street, and even in this frequented part of the city it was not broken by the passers or vehicles. In the experi-

ments which were made during the grand maneuvers in Haute Champagne by General Davoust, a wire was laid along the Bricon route between two temporary posts, and it is said that a division of cavalry and one of artillery passed along over the wire, ignorant of its presence, without breaking it or even interrupting the communication. The Charolles system is used at present by a number of regiments of the French army. In the German army it is employed even to a greater extent than in France, and nearly all the regiments of cavalry and light infantry have the outfits. The maneuvers of laying and taking up the line are often gone

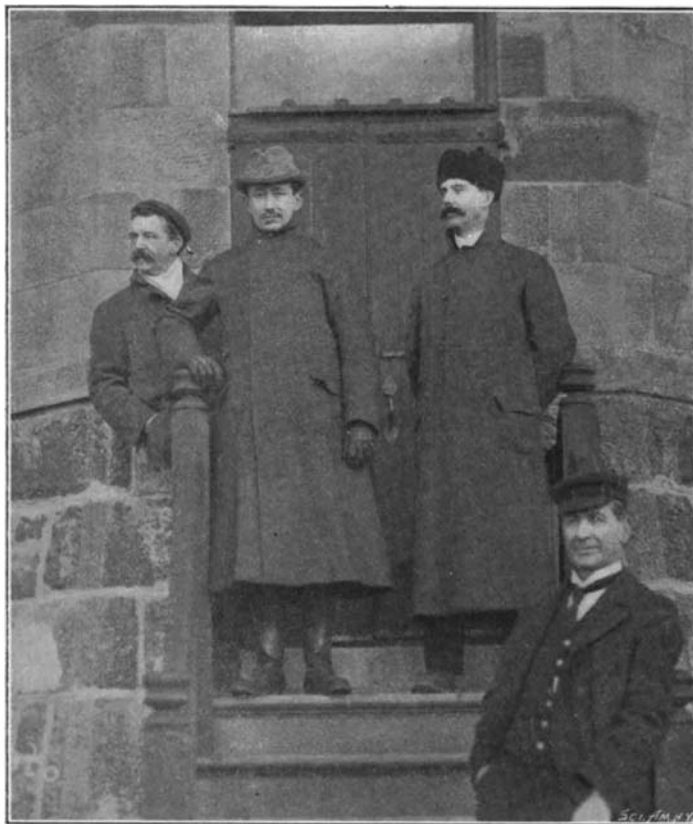
through with, and it is said that one company lately put down and took up as much as 16 miles of line in the same day. In the case of rain or damp soil the line is preferably hung upon trees or attached to houses, and experiments show that communication can be made up to 3 miles distance. Bamboo poles can be planted in the soil, and these form part of the regulation material. Microphone transmitters are generally used, but for less than a mile a pair of Bell telephones will work. For long distances a microphone and an adjustable receiver is best, and this has been found to work as far as 6 miles. Capt. Charolles adjusts the receiver for maximum sensitiveness by varying the distance between the magnet and diaphragm. A magneto bell or a Zigang vibrator may be used for the signals, but the inventor prefers to vibrate the diaphragm by heavy currents, using for the purpose the induction coil of the microphone, which is fitted with a vibrator. This gives a shrill noise in the receiver which can be heard in the open air as far as 300 feet.

When the present work on the League Island Navy Yard at Philadelphia has been completed, the yard will be the finest in the country in the point of size and equipment. The plans call for golf links and baseball ground for the use of the officers.



Photograph by James Vey.

CABOT TOWER, SIGNAL HILL, NEWFOUNDLAND.



MARCONI AND HIS ASSISTANTS AT SIGNAL HILL TOWER.